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ABSTRACT

This study considered three hypotheses: (1) cultures differ in the extent to which they represent infants as capable of vocal communication; (2) mothers' models of infant communication are influenced by their experiences in school; and (3) mothers' models of infant communication affect maternal responsiveness during the first 6 months of the infant's life. The first hypothesis is confirmed by ethnographic reports that in some societies, infants are believed to be incapable of communication and are not engaged in conversation, while in other societies, interactive speech involving 6-month-olds is reported. The second and third hypotheses were confirmed by a study of Mexican mothers and infants. Mothers were surveyed about their beliefs concerning infant readiness for verbal communication, and mother interactions with their 5-month-old infants were observed in the home. In the survey, mothers who attended school longer gave younger estimates of the age at which infants recognize the maternal voice. Mothers who gave younger estimates were observed to respond to a larger proportion of infant babbles. Nine references are included. (BC)

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INFLUENCES OF CULTURE AND SCHOOLING ON MOTHERS' MODELS OF INFANT CARE

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From three decades of research on mother-infant communication we have learned a great deal about its psychological consequences. We know relatively little, however, about its cultural and socioeconomic determinants. In this paper we use data from Mexico to examine some of the factors that influence maternal beliefs about communicating with infants and the effects of such beliefs on maternal behavior. Our goal, following the recommendation of Sigel (1985, p. 346), is "to enhance predictability of belief to action" in the study of parental behavior.

There are three hypotheses to be considered: (1) That **culture-specific** ethnotheories of child development vary in the extent to which they represent infants as capable of vocal communication; (2) that mothers' **person-specific** models of the infant and its communicative ability, are influenced by their experience in school, whatever the traditional ethnotheories of their culture; and (3) that these person-specific models affect maternal responsiveness during the first six months of life. We shall present some data bearing on these hypotheses and then consider their theoretical implications.

The first hypothesis can be confirmed by ethnographic data from recent child language studies. In some societies, infants are conceptualized as incapable of both talking and understanding speech, and proto-conversation with babies is absent as a convention. This is

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reported by Ochs (1988) for Samoans, and Schieffelin (1990) for the Kaluli of Papua New Guinea; both investigators also claim that infant-directed speech is rare or absent. From the Solomon Islands, however, Watson-Gegeo and Gegeo (1986) report interactive speech routines involving six-month-olds among the Kwara'ae people. Thus in the Pacific region alone it is clear that cultural beliefs about infant ability to communicate, and the conventional forms of maternal behavior, vary from one culture to another, apparently due to different cultural traditions rather than formal education or other socioeconomic factors. This is consistent with earlier comparative analyses by Konner (1977) and Field and Widmayer (1981).

To evaluate the second and third hypotheses we turn to findings from a study done by our research group in the city of Cuernavaca, Morelos in Mexico, from 1983 to 1985. The study included two forms of data collection. The first was a survey of mothers with young children in two low-income colonias or neighborhoods. This survey covered 333 mothers ranging in age from 15 to 37, each of whom had attended school at least 1 and no more than 9 years and was currently rearing a child under 48 months of age. The average mother was 25 years old, had been to school for 6 years and had 3 children. The second form of data collection was home observations of a sub-sample of mother-infant dyads. The home observations were conducted on 72 mother-infant dyads when the infant was 5 and 10, or 10 and 15, months of age. (A fuller account of the settings, samples and procedures appears in LeVine et al., in press, a.)

To test the second hypothesis, that a mother's school experience influences her person-specific models about the readiness of infants for vocal communication, we examine the survey data. The mothers were asked for their estimate of the age, in months, at which infants can recognize the mother's voice. We assume that mothers who view their children as ready to communicate during infancy would give an earlier estimate of that age. Table 1 shows that when

the mothers are divided into three levels of schooling, those at a higher level gave an earlier estimate. The correlation of schooling as a continuous variable with the age estimate is significant ($r = -.26$, $p < .001$). Table 2 shows that when several socioeconomic and other associated variables are controlled, maternal schooling still accounts for a significant portion of the variance in the age estimates of the infant's recognition of the mother's voice. The model which contains only the background variables such as the neighborhood in which the mother lived, the husband's level of education, and the number of consumer durables, accounts for roughly 4% of the variance. Adding in number of children -- which may represent the effect of child rearing experience on the mother's estimation of infant communicative ability -- contributes significantly to the estimate of the dependent variable, but adds little to the variance accounted for. Adding maternal schooling into the model accounts for significantly more.

The behavior observations at 5 months are most relevant to find out if this particular belief -- that the infant knows its mother's voice at an early age -- has an impact on maternal behavior. We have observational information on 29 mother-infant dyads at that age. There is, as Table 3 shows, a modest association between maternal schooling and observed responsiveness to the infant's babble at five months. This variable, i.e. mother's responding in any way (not necessarily verbally) to the baby's non-distress vocalization, was chosen as an indicator of the tendency to treat the baby at five months as a communicative partner for contingent vocal (if not actually verbal) interaction. The mothers with incomplete primary school (1-5 years) responded to a smaller proportion of infant babbles than those who had attended school longer. Using schooling as a continuous variable, its correlation with the maternal behavior variable is .36, which is not significant in this small sample. As Table 4 shows, however, the correlation between the maternal age estimate and observed responsiveness is statistically significant at -.39

($p < .05$): Mothers who give a younger age for infant recognition of the mother's face respond to a larger proportion of infant vocalizations at 5 months. The results of a regression analysis, displayed in Table 5, indicate that this relationship is significant even when maternal schooling is controlled and, together with schooling, accounts for almost a third of the variance in observed responsiveness.

Thus the belief variable that is correlated with maternal schooling in the survey sample is shown to be related to maternal behavior in the smaller 5-month observation sample. This suggests that schooling affects maternal belief concerning readiness for communication in early infancy, and that women who believe their infants have capacities for communication at an earlier age are more likely to be responsive to their babbles at 5 months..

These findings would not be developmentally significant if the communicative interaction ended at five months, but Table 6 shows that in the sample of 72 mother-infant dyads as a whole, the overall relationship of maternal schooling to responsiveness variables continues to be significant at 10 and 15 months, when children are moving into the most critical period for language acquisition. This fits a conception of schooling as training in verbal communication between an adult expert and a child novice, a pedagogical model acquired by mothers in the classroom and applied in the domestic setting of infant care, as women with more formal education become convinced that even young infants are capable of communication. This effect may be particularly forceful for women from agrarian communities in which traditional learning follows the apprenticeship model of gradual participation rather than verbal instruction: for them, the school classroom represents a novel learning relationship based on verbal communication. The longer they attend school, the more fully are they socialized into this new pedagogical model and the more likely are they to think it appropriate in the situation of infant care.

We do not claim that this is the only plausible explanation of the data we have shown you, but it is certainly worthy of further investigation. We do claim to have found a connection between belief and behavior in the mother's estimation of an early age for infant recognition of maternal voice as linked to her responsiveness to vocalizations at 5 months. This may be the start of a different pathway for language socialization among infants of more educated mothers, one based on contingent responsiveness that becomes elaborated as the child becomes more capable of speech.

To summarize: The first hypothesis, that ethnotheories of infant communicative ability vary across cultures, is confirmed by ethnographic reports that in some societies infants are believed incapable of communication and are not engaged in conversation. The second hypothesis, that schooling affects maternal beliefs concerning infant communicative ability, has been confirmed by our survey in urban Mexico, showing that women who attended school longer give younger estimates of the age at which infants recognize the maternal voice. The third hypothesis, that maternal beliefs acquired in school influence mother-infant communication, has received confirmation from the results of our home observations at five months, in which women who gave younger estimates responded to a larger proportion of infant babbles. All of these findings need and deserve further investigation in other settings and with improved research designs. They provide support for a view that contingent vocal interaction between mother and infant is determined by the mother's model of her infant (see Kaye, 1982), which is the joint product of the cultural ethnotheory of child development prevailing in her local environment and her own educational experience in school.

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Table 1. Mother's Estimate of Age at Which Infant Recognizes Mother's Voice, by Level of Maternal Schooling (N = 333)

	MATERNAL SCHOOLING		
	1-5 years (n=82)	6 years (n=108)	7-9 years (n=143)
Mean Estimate (in months)	5.3	4.0	3.1

$F(2,330) = 12.8, p < .001$

$r = -.26, p < .001$

Table 2. Regression: Mother's Estimate of Age at Which Infant Recognizes Mother's Voice, Predicted by Number of Children and Maternal Schooling (N = 333)

Variable	DF	Parameter Estimate	T	p	R^2
Intercept	1	6.40	6.10	.0001	
Colonia	1	.74	1.85	.065	
Husband's Schooling	1	-.04	-.71	--	
Consumer Durables	1	.02	.20	--	.037*
No.of Children	1	-.29	-2.22	.027	.039**
Maternal Schooling	1	-.40	-4.56	.0001	.10+

* $F(3,306) = 3.94, p < .01$
** $F(4,305) = 3.09, p < .02$
\+ $F(5,304) = 6.79, p < .0001$

Table 3. Mother's Responsiveness to Infant Babbles in Home Observations at 5 Months of Age, by Level of Maternal Schooling (N = 29)

	MATERNAL SCHOOLING		
	1-5 years (n=8)	6 years (n=10)	7-9 years (n=11)
Mean Proportion of Infant Babbles to Which Mother Responded	.44	.68	.65

$F(2,26) = 3.5, p < .05$

Table 4. Correlations of Maternal Schooling, Mother's Estimate of Age at which Infant Recognizes Mother's Voice and Maternal Responsiveness to Infant Babbles in the 5-Month Sample (N=29)

	Schooling	Estimate	Responsiveness
Schooling	-	-.24	.36
Estimate	-	-	-.39*
Responsiveness	-	-	-

* $p < .05$

Table 5. Regression: Maternal Responsiveness to Infant Babbles at Five Months, as Predicted by Maternal Schooling and Mother's Estimate of Age at Which Infant Recognizes Mother's Voice (N=29)

Variable	DF	Parameter Estimate	T	p	R^2
Intercept	1	.504	3.89	.0001	--
Maternal Schooling	1	-.028	-1.61	n.s.	.14*
Mother's Estimate	1	.028	2.62	.01**	.32**

* $F(1,27) = 4.35, p < .05$
** $F(2,26) = 6.07, p < .01$

Table 6. Correlations between Parental Schooling and Maternal Responsiveness to Infants, Cuernavaca Sample

	Correlations with: Maternal Schooling			Paternal Schooling
Infant Age(months):	5	10	15	15
	(n = 29)	(n = 72)	(n = 44)	
Proportion of infant vocalizations followed by maternal speech.	.37*	.28*	.28	.04
Proportion of infant looks followed by maternal speech	.11	.28*	.36**	.18
Proportion of infant looks followed by maternal looks	.04	.22	.35*	.10
Proportion of infant motor acts followed by maternal speech	.40*	.24*	.38**	.01
Proportion of infant vocalizations followed by no maternal response[1]	-.36*	-.14	-.07	.12
Frequency of mother holding infant	-.01	-.16	-.33*	-.22

* $p < .05$; ** $p < .01$

[1] This is the reciprocal of maternal responsiveness